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(54) System for the remote testing of a modem for a speed of transmission different from the speed of reception.

(57) The invention relates to a system for the remote testing of a modem, particularly for a view data terminal, which modem has a 75-baud part for transmitting orders to the view data bank and a 1200-baud part for passing on view data messages from the bank to the view data terminal. In the case of a disturbance it can be determined from a central station whether the disturbance originates from the view data terminal or from the modem. With both bit rates the modem is tested under operating conditions, both parts being looped and use being made of self-synchronizing scramblers with the aid of which a pseudo-random bit pattern occurs on both parts.

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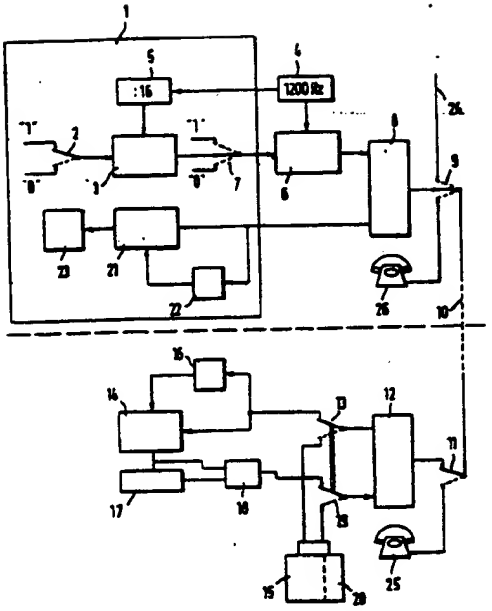
FIG. 1


1
5
:16
4
1200 Hz
"1"
2
"0"
3
"1"
"0"
7
6
8
9
26
23
21
22
25
10
16
14
13
12
11
17
18
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20
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System for the remote testing of a modem for a speed of transmission different from the speed of reception.

The invention relates to a system for the remote testing of a modem for a speed of transmission different from the speed of reception, particularly for a view data terminal.

When utilized for view data a modem of this sort has a 75-baud part for transmitting orders to the view data bank and a 1200-baud part for passing on view data messages from the bank to the view data terminal.

The modulation technique applied in the modem is described in CCITT Recommendation V 23 (Volume VIII.I). In the case of a disturbance it will be desirable to determine from a central station whether the disturbance originates from the view data terminal or from the modem. The object of the invention is to provide a suitable and cheap solution for this purpose.

The system according to the invention comprises a central station with a data tester which can generate a pseudo-random series at a bit rate of 75 bits/s, and is synchronized by a 1200 Hz clock; a speed converter formed by a modulo-2 fed-back shift register, which is also controlled by the 1200 Hz clock, and which converts from 75 to 1200 bits/s; a first modem a 1200-baud input of which is connected to an output of the speed converter, and in which the 1200-baud signal controls a modulator which makes the information suited for the transmission via the

public telephone network; a first speech data switch in an outgoing transmission line; a subscriber's station with a second modem, that is the modem to be tested, which is connected to the transmission line via a second speech data switch, and sees to the demodulation of the 1200-bit modulated signal, the 1200-baud output of the second modem being connected, via a switch, either to a second speed converter converting from 1200 bits to 75 bits/s, or to a view data terminal, the second speed converter being controlled by a 1200 Hz clock derived from the signal received, to which second speed converter a pulse lengthener for extending the pulse duration is connected, and the output of the second speed converter and that of the pulse lengthener are each connected to an input of an OR-gate and the output of the OR-gate is connected via a switch to the 75-baud input of the second modem, in which the 75-bit signal is modulated in order to reach, via the transmission line, the central station, where the first modem demodulates the 75-bit flow of information and feeds the 75-bit stream to the data tester.

With the system according to the invention the modem at the subscriber's station is tested under operating conditions. The provisions to be made at a subscriber's station are cheap and require hardly any space.

The invention will be elucidated with the help of the drawing in which Fig. 1 represents a block diagram of a central station and of the provisions at a subscriber's station, and in which Fig. 2 illustrates some graphs concerning a pulse lengthener.

A central station is represented over the horizontal dashed line and under it a subscriber's station.

In a data tester 1 a "1" or a "0" signal can be applied via a switch 2 to a scrambler 3, controlled by a 75 Hz clock, which is formed by a 1200 Hz clock 4 and a divider by 16 indicated by 5.

A speed converter 6 can be connected via a second switch 7 to the scrambler 3. The switch 7 has also positions for applying a "1" or a "0" signal to the speed converter 6, which is controlled by the 1200 Hz clock 4. The output of the speed converter 6 is connected

to the 1200-baud input of a modem 8, which can be connected via a speech data switch 9 to a subscriber's line 10, to which, also via a speech data switch 11, of a subscriber's station a modem 12 to be tested can be connected. The 1200-baud output of the latter modem is connected via a view data terminal/test switch 13 either to the input of a second speed converter 14, or to a view data terminal 15.

The converter 14 is controlled by a clock extraction circuit 16 with a clock signal of 1200 Hz. The output of the converter 14 is connected to a pulse lengthener 17, the output of which is connected to an input of an OR-gate 18, to which the output of the speed converter 14 is connected likewise. The output of the OR-gate 18 is connected via a transmission/test switch 19 to the 75-baud part of the modem 12 to be tested. In the other position of the switch 19 the modem 12 is connected to the transmitting device 20 equipped with a keyboard.

The 75-baud signal of the modem 12 is applied via the transmission line 10 and the 75-baud part of the modem 8 of the central station to a descrambler 21, which is controlled by a clock extraction circuit 22. By means of a signal indicator 23 the output signal of the descrambler 21 is compared with the input signal, which is applied via the switch 2 or 7.

The 1200-baud part of the modem 12 is tested by applying a "1" or a "0" signal to the input of the speed converter 6. This signal is converted into a pseudo-random series at a bit rate of 1200 bits/s. The pseudo-random series signal is applied to the modem 8. At the subscriber's station the clock extraction circuit 16 derives from the incoming data signal a 1200 Hz signal, which the converter 14 transmits for the 1200-baud signal.

If the transmission of the test signal has taken place without errors, the output B of the converter 14 will have the logic value "1" or "0" (Fig. 2) in conformity with the signal A, applied via the switch 7 (Fig. 2), and indicated by the signal indicator 23. Neither the pulse lengthener 17 nor the descrambler 21 have any influence on the signal A.

It is a known fact that with self-synchronizing scramblers the number of transmission errors is at least trebled.

In the situation C (Fig. 2) the signal represented is subject to disturbances on the 1200 bits/s receiving channel. Comparing C with D (Fig. 2) it appears that errors are only detected in the logic "0" state of the 75 bits/s test signal. These errors are formed into an error pulse of nominal duration (D in Fig. 2). This error pulse can reach the descrambler 21 via the 75-baud part of the modems 12 and 8, and it can be detected by the signal indicator 23, which at the same time prevents the transmission errors from being multiplied by 3. In this way the reception of a 1200-baud signal at the subscriber's station is remotely controlled.

The testing of the 75-baud part of the modem 12 takes place by applying a "1" or a "0" signal to the scrambler 3, which converts this signal into a pseudo-random series at a bit rate of 75 bits/s. This pseudo-random series signal is converted into a 1200-baud series by the speed converter 6 and after having passed the modems 8 and 12 it is reconverted into a 75-baud series by the converter 14.

If no errors have occurred in the 1200-baud channel, the errors found at the output of the 75-baud descrambler 21 are a measure for the state of the transmitting part of the modem 12. However, if any errors occur in the 1200-baud part, half of them count, because the pulse lengthener can lengthen pulses only in the "0" state of the 75-baud signal applied to said pulse lengthener. So, when the number of errors found when the switch 7 is in the "0" or in the "1" state is compared with the number of those found when the switch 7 is in the position drawn and it appears that the ratio of errors resulting from this comparison differs from the ratio 2 : 1, then both the 1200-baud part and the 75-baud part are faulty.

The subscriber's station can be connected to the data bank via the subscriber's line 10 and a subscriber's line 24. The access to the data bank is obtained by means of the telephone set 25. When the connection has been effected, the information is transmitted to the bank by means of the transmitting device 20. When the subscriber finds a

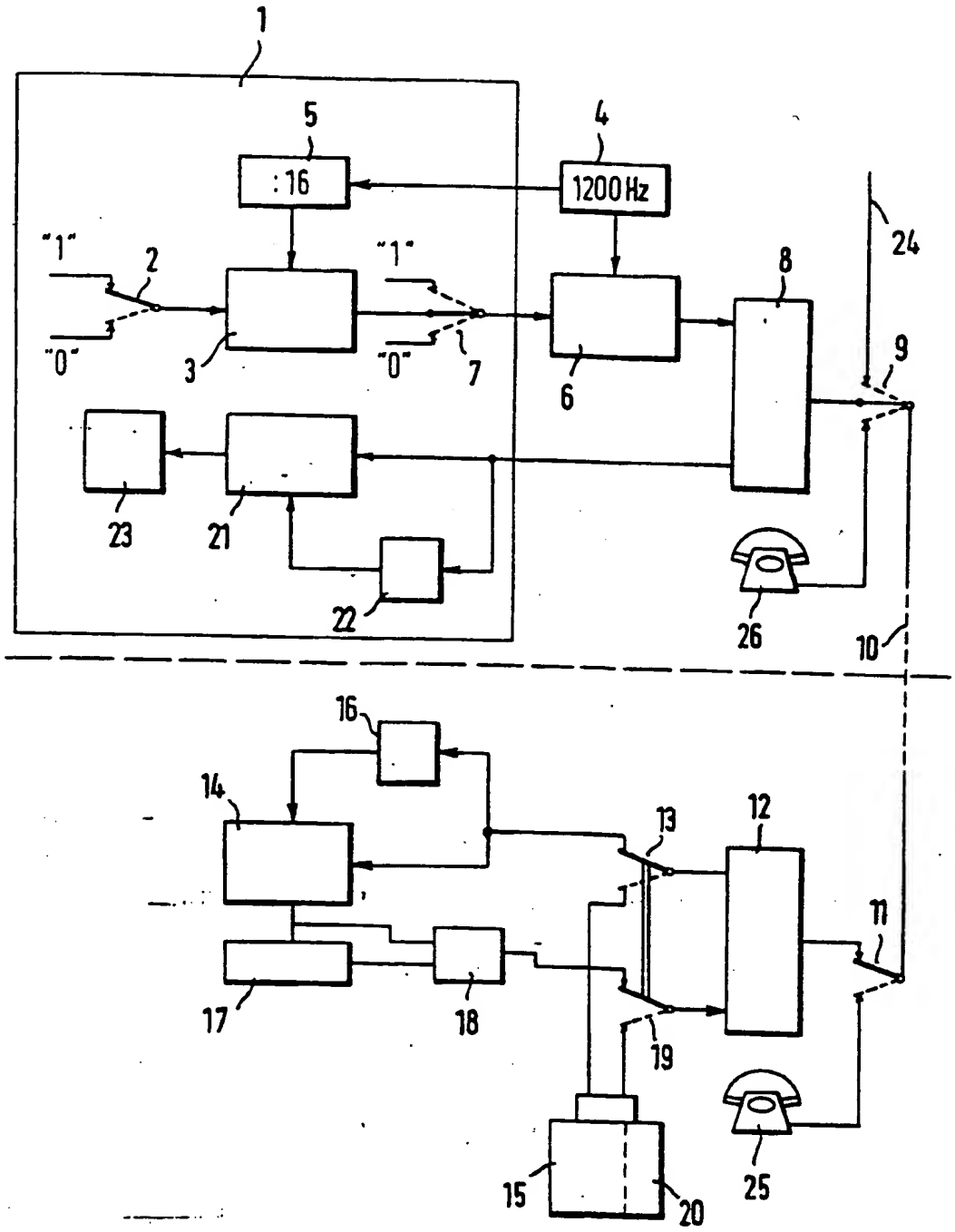
disturbance in the reception, he phones up the central station to which the telephone set 26 belongs. The central station requests the subscriber to reverse the switches 13 and 19, after which the testing process can start.

The device of the data tester 1 as described is only given by way of example.

Claim :

System for the remote testing of a modem for a speed of transmission different from the speed of reception, characterized by a central station with a data tester (1), which can generate a pseudo-random series at a bit rate of 75 bits/s, and is synchronized by a 1200 Hz clock (4); a speed converter (6) formed by a modulo-2 fed-back shift register, which is also controlled by the 1200 Hz clock, and which converts from 75 to 1200 bits/s; a first modem (8) a 1200-baud input of which is connected to an output of the speed converter (6), in which first modem (8) the 1200-baud signal controls a modulator which makes the information suited for the transmission via the public telephone network; a first speech data switch (9) in an outgoing transmission line (10); a subscriber's station with a second modem, that is the modem (12) to be tested, which is connected to the transmission line (10) via a second speech data switch (11), and sees to the demodulation of the 1200-bit modulated signal, the 1200-baud output of the second modem (12) being connected, via a switch (13), either to a second speed converter (14) converting from 1200 bits to 75 bits/s, or to a view data terminal (15), the second speed converter (14) being controlled by a 1200 Hz clock (16) derived from the signal received, to which second speed converter a pulse lengthener (17) for extending the pulse duration is connected, and the output of the second speed converter (14) and that of the pulse lengthener (17) are each connected to an input of an OR-gate (18) and the output of the OR-gate is connected via a switch (19) to the 75-baud input of the second modem (12), in which the 75-bit signal is modulated in order to reach, via the transmission line (10), the central station, where the first modem (8) demodulates the 75-bit flow of information and feeds the 75-bit stream to the data tester (1).

FIG. 1


1
5
:16
4
1200 Hz
"1"
2
"0"
3
"1"
"0"
7
6
8
24
9
23
21
22
26
10
16
14
13
12
11
17
18
19
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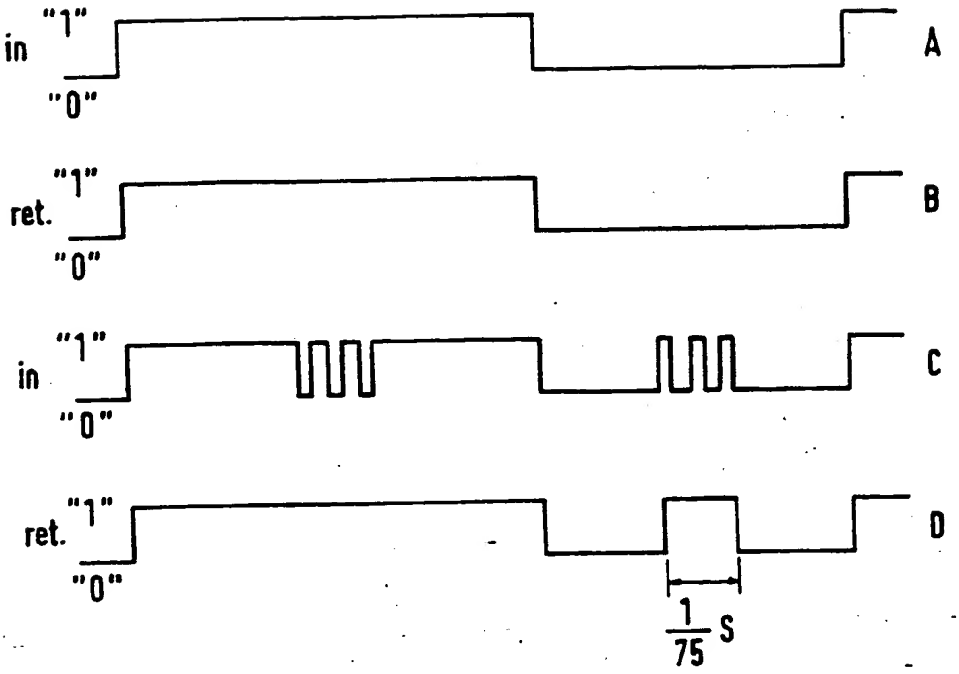
20
25

FIG. 2



European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 80 20 0607

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	DE - B - 2 814 837 (SEL) * Column 2, lines 11-21; column 2, lines 54-57; column 3, lines 4-26; 54-64; column 4, lines 6-11; column 6, lines 31-45 *	only claim
	WESCON TECHNICAL PAPERS, vol. 16 september 1972, Western Electronic Show and Convention Los Angeles US SEPE et al.: "Modern test sets for digital data communications", pages 14/1-1 to 14/1-7 * Page 14/1-1, right-hand column, lines 25-28; page 14/1-2, left-hand column, lines 36-50; page 14/1-3, left-hand column, lines 30-39 *	only claim
EP	EP - A - 0 008 608 (TEKADE) * Page 1, lines 1-6; page 3, lines 1-5, 23-28; page 4, lines 2-25; page 6, lines 18-25 *	only claim

CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

H 04 L 1/24

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

H 04 L 1/24
H 04 N 7/00
H 04 L 25/49

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30-09-1980	HOLPER

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